

# FOOD AND FEEDING HABITS OF *LABEO BOGGUT* (SYKES) FROM KULGARHI RESERVOIR (MADHYA PRADESH)<sup>1</sup>

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(With two text-figures)

## INTRODUCTION

The cyprinid fish, *Labeo boggut* (Sykes), is one of the common minor carps of Madhya Pradesh. According to Day (1889), the fish is distributed in the "Central Provinces, Bengal, the Punjab, Bombay, Deccan, common to Jubulpore and in Cutch; and Madras". The maximum length attained by this species has been recorded by Day (op. cit.) as more than 191 mm and Job *et al.* (1955) as 355 mm in Mahanadi. However, the largest specimen recorded in the present investigations measured only 198 mm in total length.

As this species does not grow to a large size, it cannot be regarded as an economical species. For the successful development of fisheries resources in the reservoir, some knowledge on the food and feeding habits of uneconomic species of fish is necessary, as they are likely to compete with cultivable major carps for food and space, resulting in the latter's poor growth. Natarajan *et al.* (1975) have stated that many of the carp minnows and trash fishes are harmful to the productivity of major carps because of the similarity in feeding habits. For the same reason the importance of control of these fishes has been emphasised by Bennett (1962), Jhingran

(1965) and Natarajan (1971).

Barring a brief account on food composition of *Labeo boggut* by Chacko (1951), no detailed information on its food and feeding habits appears to be on record. The studies on this important aspect of biology of this uneconomic species were, therefore, undertaken in Kulgarhi reservoir where it is encountered in fairly large number, being an indigenous species of the surrounding waters.

## MATERIAL AND METHODS

The material for the present study was obtained from cast net fishing. Altogether, 546 specimens of *Labeo boggut* measuring 63-198 mm in total length were examined from July 1970 to June 1971 for studying its food and feeding habits.

The guts were removed from fresh specimens and preserved in 5% formalin for subsequent study. The contents of the preserved guts were pooled monthwise in order to save time and labour and to minimise error in the estimation of food components, following a method given by Karamchandani & Desai (1962). While drawing samples for microscopical examination, the pooled gut-contents were thoroughly mixed and the gut-contents were analysed by

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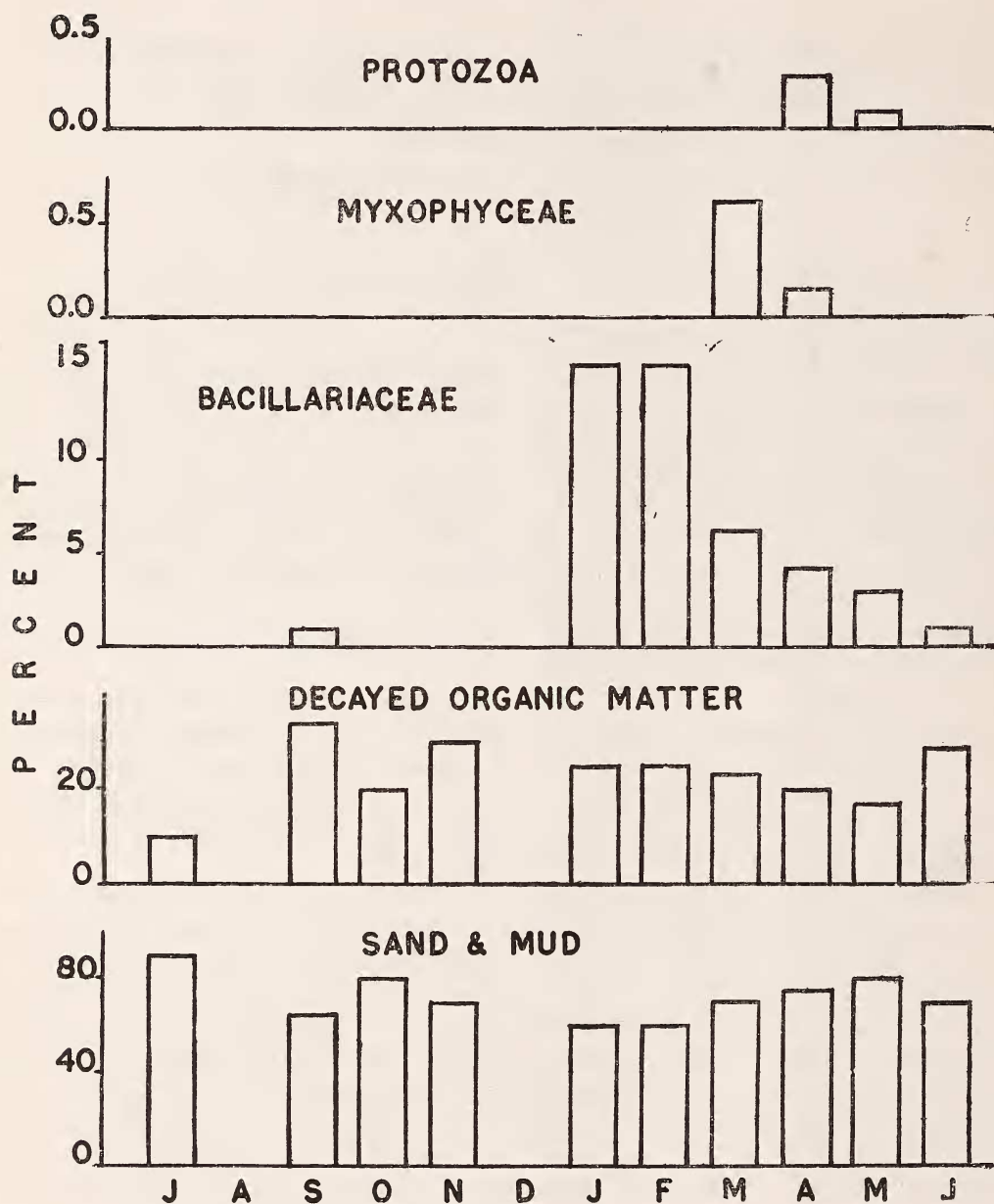


Fig. 1. Fluctuations of broad groups of the gut contents of *Labeo boggut* (Sykes) in various months. (The samples were not available in the months of August and December).

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modified points method adopted by Bhatnagar & Karamchandani (1970).

The feeding intensity was measured by recording the 'condition of feed' of the guts which were classified as full,  $\frac{3}{4}$  full,  $\frac{1}{2}$  full,  $\frac{1}{4}$  full, trace and empty, depending on the degree of distension of the guts and the amount of the gut-contents. The 'condition of feed' as recorded in the present study is expected to depict a correct picture of feeding intensity, as the fish samples were obtained from the cast net catches and the guts were removed from fresh specimens and immediately preserved in formalin. The feeding intensity as expressed by 'condition of feed' was correlated with condition factor 'K' ( $K=W \times 10^5/L^3$ , where  $W$ =weight of fish (gm),  $L$ =Total length (mm) of fish) and relative condition 'Kn' ( $Kn = Wo/Wc$ , where  $Wo$ =observed weight (gm),  $Wc$ =calculated weight (gm) by Length-Weight relationship formula), with a view to determine whether wide variations, if any, in 'K' and 'Kn' values were due to feeding or some other factor.

## OBSERVATIONS

(i) *Composition of gut-contents*:— The overall picture of the broad groups of gut-contents, by volume, of *Labeo boggut* for the period July 1970 to June 1971 is given in Table 1 and their fluctuations in various months are shown in Text-fig. 1. The month-wise fluctuations of various components are presented in Table 2 and the salient features thereof are enumerated below:

(a) *Mud mixed with sand*: This item which was encountered in the guts throughout the year constituted the main bulk of the gut-contents and its volume ranged from 65.0% in September to 90.0% in July, the average being 72.0%.

TABLE 1  
BROAD GROUPS OF THE GUT-CONTENTS OF  
*Labeo boggut* (SYKES)

Broad groups of gut-contents	Percentage composition
Mud mixed with sand	72.00
Decayed organic matter	23.30
<i>Planktonic food</i>	
Bacillariaceae	4.59
Myxophyceae	0.08
Protozoa	0.03
	4.70

(b) *Decayed organic matter*: This mainly comprised unidentifiable mucilaginous mass of decayed plant matter of greenish dirty colour. It occurred regularly in the guts throughout the year. Next only to mud and sand, this matter made up considerable bulk in the gut-contents, constituting on an average 23.3% by volume. The large quantities of this matter occurred in September (34.0%), November (30.0%) and June (29.0%). It was moderately encountered from January to May (17.0% to 25.0%) and poorly in July (10.0%).

(c) *Planktonic food*: This item comprised planktonic organisms, belonging to Bacillariaceae, Myxophyceae and protozoa and made up 4.7% in the total gut-contents. The content of planktonic forms in the guts was maximum during January and February (15.0% in each month).

*Bacillariaceae* (Diatoms): Among the identifiable planktonic food, the diatoms were the most abundant (4.59%) in the total gut-contents. This group was represented by genera *Diploneis* (2.31%), *Melosira* (1.44%), *Gyrosigma* (0.71%), *Navicula* (0.11%) and *Amphora* (0.02%). Of these, *Diploneis*, the most important genus, occurred abundantly in January (13.47%) and February (6.85%), scarcely in March (1.45%) and May (1.29%) and

TABLE 2  
MONTHWISE FLUCTUATIONS OF VARIOUS COMPONENTS OF GUT-CONTENTS (% BY VOLUME) OF *Labeo boggut* (SYKES)

Months	July, 1970	Aug.*	Sept.	Oct.	Nov.	Dec.*	Jan. 1971	Feb.	March	April	May	June
Size - range (mm)	105-147	—	117-156	63-155	131-135	—	69-165	80-185	87-198	92-190	100-145	100-165
Guts containing food (%)	100.00	—	100.00	100.00	100.00	—	100.00	100.00	100.00	100.00	97.18	87.50
Gut-contents:-												
Mud mixed with sand	90.00	—	65.00	80.00	70.00	—	60.00	60.00	70.00	75.00	80.00	70.00
Decayed organic matter	10.00	—	34.00	20.00	30.00	—	25.00	25.00	23.00	20.00	17.00	29.00
Bacillariaceae:												
<i>Diploneis</i> sp.	0.00	—	0.00	0.00	0.00	—	13.47	6.85	1.45	0.00	1.29	0.00
<i>Melosira</i> sp.	0.00	—	0.92	0.00	0.00	—	1.12	7.74	2.00	2.00	0.52	0.11
<i>Gyrosigma</i> sp.	0.00	—	0.00	0.00	0.00	—	0.00	0.00	2.92	2.29	1.03	0.81
<i>Navicula</i> sp.	0.00	—	0.08	0.00	0.00	—	0.18	0.41	0.00	0.28	0.08	0.08
<i>Amphora</i> sp.	0.00	—	0.00	0.00	0.00	—	0.23	0.00	0.00	0.00	0.00	0.00
	0.00	—	1.00	0.00	0.00	—	15.00	15.00	6.37	4.57	2.92	1.00
Myxophyceae:												
<i>Merismopedia</i> sp.	0.00	—	0.00	0.00	0.00	—	0.00	0.00	0.63	0.15	0.00	0.00
Protozoa:												
<i>Difflugia</i> sp.	0.00	—	0.00	0.00	0.00	—	0.00	0.00	0.00	0.28	0.08	0.00

\* Samples not available.

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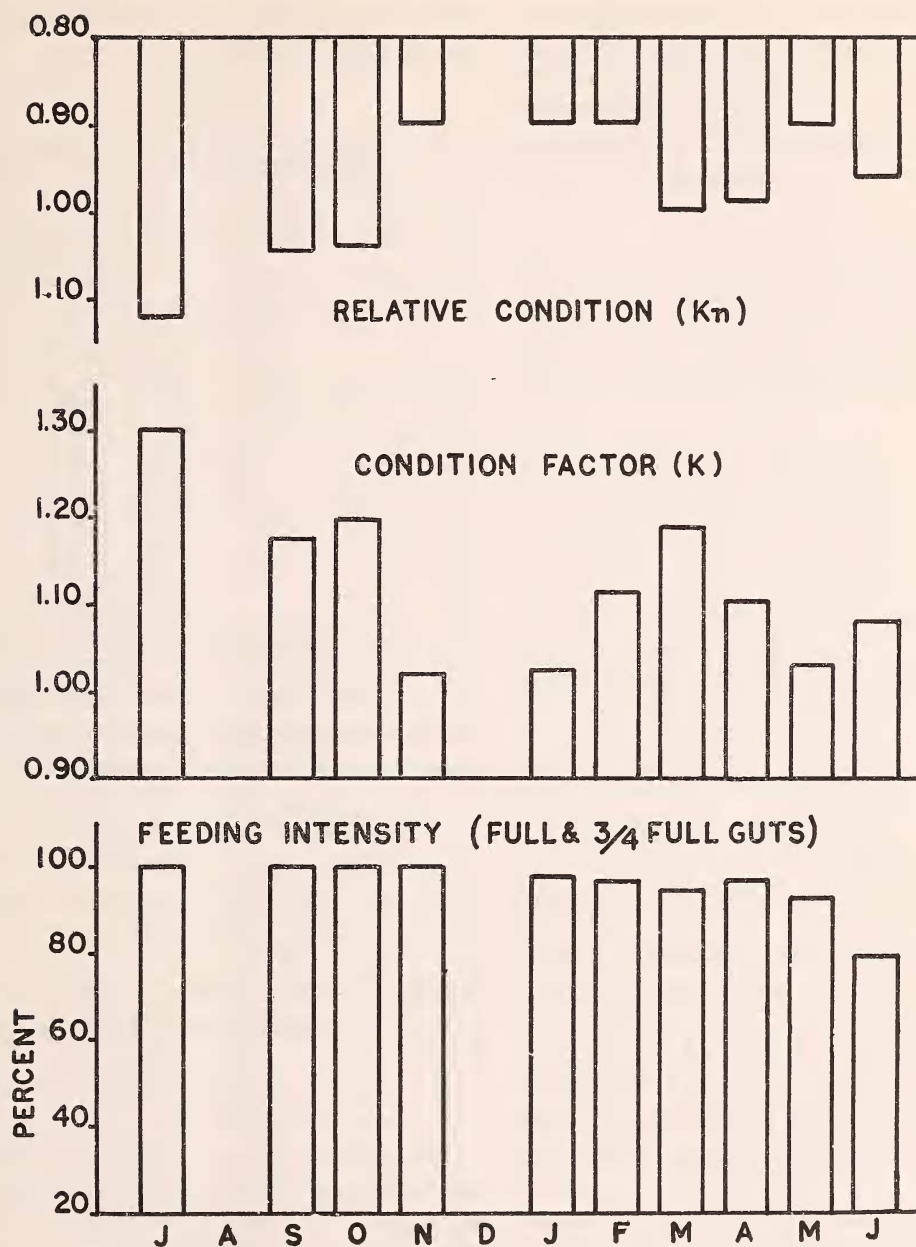


Fig. 2. Fluctuations in the feeding intensity, condition factor (K) and relative condition ( $K_n$ ) of *Labeo boggut* (Sykes) in various months. (The samples were not available in the months of August and December).



was totally absent in rest of the months of observations. *Melosira*, the next important genus, occurred in fairly large quantity in February (7.74%), scarcely in January, March to June and September (0.11 to 2.0%) and was totally absent in rest of the months of observations.

*Myxophyceae* (Blue-green algae): The blue-green algae, represented entirely by genus, *Merismopedia*, made up 0.08% in the bulk of the gut-contents. It was found to occur in the months of March (0.63%) and April (0.15%) only.

*Protozoa*: This group, comprising genus *Diffugia* only, made up 0.03% in the bulk of gut-contents and occurred in the months of April (0.28%) and May (0.08%) only.

(ii) *Feeding intensity and 'condition' of fish:*

The percentage of  $\frac{3}{4}$  full and full guts, indicating feeding intensity and the values of condition factor (K) and relative condition (Kn) are depicted monthwise in Text-fig. 2.

As may be seen from Text-fig. 2, the feeding intensity was pronounced almost throughout the year, the percentage of  $\frac{3}{4}$  full and full guts mostly ranging from 92.65 to 100. Whereas, the values of 'K' and 'Kn' varied regularly, having two minima in November and May and two maxima in July and March. A positive correlation was found between the feeding activities and condition factor (K) in *Tor tor* (Ham.) by Desai (1970) and in *Labeo fimbriatus* (Bloch) by Bhatnagar & Karamchandani (1970). However, in the present case, there is no direct correlation between these variables.

(iii) *Competition for food with major carps:* With a view to evaluate the status of *L. boggut* in the economy of fish culture in Kulgarhi reservoir, its food has been compared with that of Mrigal and Rohu in Table 3, as the

former feeds entirely and the latter partly at bottom, like *L. boggut*.

TABLE 3

COMPOSITION OF GUT-CONTENTS OF *Labeo boggut*, *Cirrhina mrigala* AND *Labeo rohita* FROM KULGHAHI RESERVOIR

Items of Gut-contents	Percentage composition of gut-contents		
	<i>L. boggut</i>	<i>C. mrigala</i>	<i>L. rohita</i>
Mud mixed with sand	72.00	65.66	57.24
Decayed organic matter	23.30	24.69	29.16
Diatoms	4.59	8.14	5.68
Green algae	0.00	0.94	3.57
Blue-green algae	0.08	0.27	1.22
Dinoflagellates	0.00	0.17	2.44
Rotifers	0.00	0.13	0.62
Protozoans	0.03	0.00	0.07
Total	100.00	100.00	100.00

Of the planktonic food, *Melosira*, *Navicula* and *Gyrosigma* among diatoms, *Merismopedia* among blue-green algae and *Diffugia* among protozoans were commonly encountered in the guts of *L. boggut* and the two major carps.

As the bulk of the gut-contents of *L. boggut*, *C. mrigala* and *L. rohita* (99.89%, 98.49% and 92.08% respectively) comprises mud mixed with sand, decayed organic matter and diatoms (Table 3), the food and feeding habits of three species are almost comparable, indicating their bottom feeding habits in the reservoir.

#### REMARKS

Uneconomic species of fish which are invariably abundant in the reservoirs are considered responsible for low fish production in such waters as they are reported to compete, for food and space, with cultivated species of major carps. *Labeo boggut* contributes a major share (27.6% by number) to the catches of

uneconomic species of Kulgarhi reservoir, which called for detailed investigations on one of the important aspects of its biology—the food and feeding habits.

The observations made in the present study indicated that though the feeding intensity, as determined by 'condition of feed' in the guts, was pronounced almost throughout the year (92.65% to 100.00%  $\frac{3}{4}$  full and full guts), the 'condition' of fish ('K' and 'Kn') showed wide variations giving two maxima and two minima (Text-fig. 2) during the course of the year. Generally, the 'condition' of a fish is greatly influenced by its feeding activities (Desai, op. cit. and Bhatnagar & Karamchandani, op. cit.). But, in the present case, the two variables do not exhibit any direct correlation between them. It is, however, interesting to note that when the fluctuations of main components of the gut-contents (Text-fig. 1) are compared with those of 'K' and 'Kn' values, the mud mixed with sand which forms the bulk of the gut-contents exhibits almost the same trend as those of 'K' and 'Kn' values.<sup>4</sup> This gives strong indication that the fish in all probability draws nutrition from mud and sand (72.0%) mixed with fine organic matter and also from decayed organic matter (23.3%), particularly when the plankton content in the guts is strikingly very low (4.7%). These observations amply lend support to those by David *et al.* (1969), who have stated to the effect that the deposited particulate organic matter (in ooze) and epiphyton form considerable part of food for bottom feeders as well as young stages and smaller species of fishes.

Job *et al.* (1955) have stated that the cultivation of slow growing fish, *Labeo boggut*,

<sup>4</sup> However, as may be expected, during the maturing period of gonads from March to June, 'K' and 'Kn' values show downward trend opposite to that of mud mixed with sand.

along with fast growing, economically important species—the major carps should be avoided evidently because the former does not attain a very large size in its life time and competes for food and space with the latter species. The composition of the gut-contents of *L. boggut*, in the present case, has confirmed that it is a bottom feeder as its guts were found gorged with mud mixed with sand and debris (Text-fig. 1 and Table 1) and its comparison with that of *Cirrhina mrigala* and *Labeo rohita* has indicated that its feeding habits are highly identical to those of the two major carps (Table 3).

Though in the present study the food of *Labeo boggut* measuring below 63 mm was not studied, it seems very likely that the young fry of this bottom feeding fish, like adult, does not feed on zooplankton, as the carp fry in general have been found to subsist mostly on phytoplankton by some workers. Hora (1943) observed that the micro-phytoplankton serves as food of the fry of carps in their earlier stages of growth. According to Mookerjee (1944, 1945), 5 to 10 mm long fry of Indian major carps namely *Catla catla*, *Labeo rohita* and *Labeo calbasu* feed exclusively on unicellular algae and from 10 to 20 mm stages, they feed on protozoa of various kinds. Chacko & Kuriyan (1948) stated that the food of fry of *Labeo fimbriatus* is similar to that of the adult but lacks crustacean and insect remains. Bhatnagar & Karamchandani (op. cit.) found the food of fry of *L. fimbriatus* comprising of mostly phytoplankton, the zooplankton (copepods) being only 0.2%.

Since in Kulgarhi reservoir *L. boggut* and the two major carps have been found to subsist mostly on bottom mud mixed with debris and draw nutrition from it the plentiful availability of this item at the reservoir bottom is not likely to cause active competition for food

among them. It is, therefore, apparent that the presence of *L. boggut*, the indigenous species of the reservoir, would not adversely affect the culture fishery of the reservoir, but, on the contrary it would add substantially to the reservoir fishery, it being abundant there.

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